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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/530,720	04/08/2005	Masahiro Kimata	403368/SAKAI	2094
23548 7590 08/28/2007 LEYDIG VOIT & MAYER, LTD 700 THIRTEENTH ST. NW SUITE 300 WASHINGTON, DC 20005-3960			EXAMINER BEHM, HARRY RAYMOND	
			ART UNIT 2838	PAPER NUMBER
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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

TH

**Office Action Summary**

Application No.

10/530,720

Applicant(s)

KIMATA ET AL.

Examiner

Harry Behm

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 20 June 2007.  
 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.  
 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-9, 11 and 15 is/are pending in the application.  
 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.  
 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.  
 6) ☒ Claim(s) 1-2, 7-9 and 11 is/are rejected.  
 7) ☒ Claim(s) 3-6 and 15 is/are objected to.  
 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.  
 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).  
 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
 a) ☐ All b) ☐ Some \* c) ☐ None of:  
 1. ☐ Certified copies of the priority documents have been received.  
 2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)  
 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)  
 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)  
 Paper No(s)/Mail Date \_\_\_\_\_.  
 4) ☐ Interview Summary (PTO-413)  
 Paper No(s)/Mail Date. \_\_\_\_\_.  
 5) ☐ Notice of Informal Patent Application  
 6) ☐ Other: \_\_\_\_\_.

## **DETAILED ACTION**

### ***Continued Examination Under 37 CFR 1.114***

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 6/20/07 has been entered.

### ***Response to Arguments***

Applicant's arguments filed 6/20/07 have been fully considered but they are not persuasive. Applicant argues that duplicative limitations were removed from claim 1, but Applicant has broadened the claims by deleting limitations such as the requirement for a comparison.

### ***Allowable Subject Matter***

The indicated allowability of claims 2, 7-9 and 11 is withdrawn in view of the newly discovered reference(s) to Mutoh (US 5,023,538). Rejections based on the newly cited reference(s) follow.

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

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(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-2, 7-9 and 11 rejected under 35 U.S.C. 102(b) as being anticipated by Mutoh (US 5,023,538).

With respect to Claim 1, Mutoh discloses an apparatus for controlling a power converter in which an output voltage is controlled by pulse-width-modulation control, the apparatus comprising:

a voltage-vector control unit (Fig. 1 6) that determines, based on a voltage instruction value for the power converter, voltage vectors (Fig. 1 U,V,W) output from the power converter in one control cycle [output of 1 vector] of the pulse-width-modulation control (Fig. 11 U,V,W) and durations of outputting of the voltage vectors;

a voltage-vector adjusting unit (Fig. 1 20) that adjusts the duration of outputting of the voltage vectors so that the duration of outputting a zero-voltage vector [To] is either longer than a fixed time greater than zero (Fig. 8 Tomin) or is zero; and

a firing-pulse generating unit (Fig. 1 30) that generates a signal, for turning on and off semiconductor switching elements (Fig. 1 PWM INVERTER1 elements) included in the power converter, based on the durations of outputting of the voltage vectors as adjusted by the voltage-vector adjusting unit (Fig. 1 20).

With respect to Claim 2, Mutoh discloses apparatus according to claim 1, wherein the voltage-vector adjusting unit adjusts the durations of outputting of the voltage vectors so that

when the duration of out-putting of the zero-voltage vector  $[T_o]$  is longer than a predetermined time (Fig. 8 108 NO) the duration of out-putting the zero-voltage vector is ensured for at least for the fixed time (Fig. 8 111), and

when the duration of outputting of the zero-voltage vector is shorter than the predetermined time (Fig. 8 108 YES), the duration of outputting of the zero-voltage vector becomes zero (Fig. 6c en = avi).

With respect to Claim 7, Mutoh discloses the apparatus according to claim 1, further comprising: a delay unit (Fig. 1 20) that delays the voltage vectors (Fig. 1 U,V,W) output from the voltage-vector adjusting unit by one control cycle [each vector output to inverter in a PWM cycle], and outputs the voltage vectors to the voltage-vector adjusting unit, wherein

the voltage-vector adjusting unit calculates an error accompanied by an adjustment of the durations  $[T_o \text{ not divided}]$  of outputting of the voltage vectors, and adjusts (Fig. 8 108 NO) the durations of outputting of the voltage vectors by correcting the voltage vectors in a current cycle (Fig. 8 111 outputting  $T_o$ ) with the error calculated in a previous cycle  $[T_{o1} \text{ is combined with } T_{o2} \text{ since } T_o/2 < T_{\text{min}}]$ ,

when a duration of outputting of the zero-voltage vector is longer than a predetermined time  $[T_o > T_{\text{min}}]$ , the duration of outputting of the zero-voltage vector is ensured at least for the fixed time  $[T_{\text{min}}]$ , and

when the duration of outputting of the zero-voltage vector  $[T_{o1}]$  is shorter than the predetermined time  $[T_{\text{min}}]$ , the duration of outputting of the zero-voltage vector becomes zero [zero-voltage vector undivided].

With respect to Claim 8, Mutoh discloses the apparatus according to claim 1, wherein the voltage- vector adjusting unit adjusts the durations of outputting of the voltage vectors so that the duration of outputting of the zero-voltage vector is ensured for at least the fixed time [T<sub>omin</sub>].

With respect to Claim 9, Mutoh discloses the apparatus according to claim 1, wherein the voltage-vector adjusting unit adjusts durations of outputting of the voltage vectors so that the duration of outputting of the zero-voltage vector is ensured at least for the fixed time [T<sub>omin</sub>] without changing relative ratio of output durations of the voltage vectors, other than the zero-voltage vector [switching mode I and II, vector v<sub>i</sub> and v<sub>j</sub> has same ratio].

With respect to Claim 11, Mutoh discloses the apparatus according to claim 1, wherein, when the duration of outputting of the zero-voltage vector is set to zero [switching mode II or III], the voltage-vector adjusting unit adjusts the durations of outputting of the voltage vectors so that durations of outputting the voltage vectors other than the zero-voltage vector also become either longer than the fixed time or become zero [vectors satisfy minimum off time].

Claims 1-2 rejected under 35 U.S.C. 102(b) as being anticipated by Mutoh (US 5,053,690).

With respect to Claim 1, Mutoh discloses an apparatus for controlling a power converter in which an output voltage is controlled by pulse-width-modulation control, the apparatus comprising:

a voltage-vector control unit (Fig. 1 70) that determines, based on a voltage instruction value for the power converter, voltage vectors output from the power converter in one control cycle of the pulse-width-modulation control and durations of outputting of the voltage vectors (Fig. 1 U,V,W);

a voltage-vector adjusting unit (Fig. 1 70) that adjusts (Fig. 8 200F) the duration of outputting of the voltage vectors so that the duration of outputting a zero-voltage vector is either longer than a fixed time (Fig. 7B  $\Delta T$ ) greater than zero or is zero (Fig. 6B  $T_o$ ); and

a firing-pulse generating unit (Fig. 1 100) that generates a signal, for turning on and off semiconductor switching elements (Fig. 1 40) included in the power converter, based on the durations of outputting of the voltage vectors as adjusted by the voltage-vector adjusting unit.

With respect to Claim 2, Mutoh discloses apparatus according to claim 1, wherein the voltage-vector adjusting unit adjusts the durations of outputting of the voltage vectors so that

when the duration of out-putting of the zero-voltage vector [ $T_o$ ] is longer than a predetermined time (Fig. 7 7B  $\Delta T$ ) the duration of out-putting the zero-voltage vector is ensured for at least for the fixed time ( $\Delta T$ ), and

when the duration of outputting of the zero-voltage vector is shorter than the predetermined time (Fig. 6B  $T_o$ ), the duration of outputting of the zero-voltage vector becomes zero (Fig. 6B  $T_o=0$ ).

Claims 1 and 11 rejected under 35 U.S.C. 102(b) as being anticipated by Ishida (US 2002/0093391).

With respect to Claim 1, Ishida discloses an apparatus for controlling a power converter in which an output voltage is controlled by pulse-width-modulation control, the apparatus comprising:

a voltage-vector control unit that determines (Fig. 1 8), based on a voltage instruction value for the power converter, voltage vectors (Fig. 1  $E_u, E_v, E_w$ ) output from the power converter in one control cycle of the pulse-width-modulation control and durations of outputting of the voltage vectors;

a voltage-vector adjusting unit (Fig. 1 9) that adjusts the duration of outputting of the voltage vectors so that the duration of outputting a zero-voltage vector is either longer than a fixed time greater than zero or is zero [all pulses must be greater than a minimum pulse width]; and

a firing-pulse generating unit (Fig. 1 6) that generates a signal (Fig. 1  $G_u, G_v, G_w, G_x, G_y, G_z$ ), for turning on and off semiconductor switching elements (Fig. 1  $Q_u, Q_v, Q_w, Q_x, Q_y, Q_z$ ) included in the power converter, based on the durations of outputting of the voltage vectors (Fig. 1  $E_u', E_v', E_w'$ ) as adjusted by the voltage-vector adjusting unit.

With respect to Claim 11, Ishida discloses the apparatus according to claim 1, wherein, when the duration of outputting of the zero-voltage vector is set to zero, the voltage-vector adjusting unit adjusts the durations of outputting of the voltage vectors so that durations of outputting the voltage vectors other than the zero-voltage vector also



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become either longer than the fixed time or become zero [vectors satisfy minimum pulse width].

Claims 1 and 11 rejected under 35 U.S.C. 102(b) as being anticipated by Maeda (US 7,173,393).

With respect to Claim 1, Maeda discloses an apparatus for controlling a power converter in which an output voltage is controlled by pulse-width-modulation control, the apparatus comprising:

- a voltage-vector control unit that determines (Fig. 9 7b), based on a voltage instruction value for the power converter, voltage vectors (Fig. 5 voltage vector command) output from the power converter in one control cycle of the pulse-width-modulation control and durations of outputting of the voltage vectors;

- a voltage-vector adjusting unit (Fig. 5 6b) that adjusts the duration of outputting of the voltage vectors so that the duration of outputting a zero-voltage vector is either longer than a fixed time (Fig. 6 SP1 specified value) greater than zero or is zero (Fig. 6 SP2); and

- a firing-pulse generating unit (Fig. 5 6f) that generates a signal for turning on and off semiconductor switching elements (Fig. 5 3 elements) included in the power converter, based on the durations of outputting of the voltage vectors (Fig. 5 voltage vector command) as adjusted by the voltage-vector adjusting unit.

With respect to Claim 11, Ishida discloses the apparatus according to claim 1, wherein, when the duration of outputting of the zero-voltage vector is set to zero, the

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voltage-vector adjusting unit adjusts the durations of outputting of the voltage vectors so that durations of outputting the voltage vectors other than the zero-voltage vector also become either longer than the fixed time (Fig. 6 SP1 specified value) or become zero [all pulses greater than minimum pulse width].

### **Conclusion**

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Harry Behm whose telephone number is 571-272-8929. The examiner can normally be reached on Business EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Karl Easthom can be reached on 571-272-1989. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

  
BAO Q. VU  
PRIMARY EXAMINER

